MD-563 4

FIELD

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UNITED STATES
DEPARTMENT OF THE INTERIOR

DI-6

APPROVED DECEMBER 1941

K.M. Waaga 1951 Contents NMBM-4

Lakewood Brick and Tile — 1
American Clay Works and Supply Co. — 2
Western Tile Mfg. Co. — 3
Denver Fire Clay Co. — 4
Hack Hyland and Fawrey Brick Co's — 6
Coors Porcelain Co. — 7.
Denver Sewer Pipe and Clay Co. — 8.
Robinson Brick and Tile — 9.
Overland Pressed Brick — 10.
Denver Terra Cotta — 11.
Ceramic Tile Mfg. Co. — 12.
Clark Brick Co. — 13.
AIN 51-21 — 14
Eldorado Springs section — 15
Rubey (Parfet) Clay mines — 22
Hogback Mine — R.B. & T. Co. — 23
Man Mine — " " " " — 24
(also Rustler, Chieften & Stranger)
Cinder Concrete Products — 25
Spring Canyon Section #1 — 26
Spring Canyon Section #2 — 29
Greenacre section [Box Elder Creek] — 32
Notes on Bellvue section — 37
Dry Creek [Handy ditch?) section — 39
Johnson Clay mine at Castle Rock — 45
AIN 50-43 — 47?
Rustler Mine - partial section Benton — 51
AIN 50-17 — 52
AIN 50-37 — 56
AIN 54-02 — 58
Fourmile Canyon reconnaissance — 60
Plans for summer 1952 — 61
Notes on Denver Directory for Spring 1954 — 63

Pearl

PE. 8445 Pramnel

Lakewood Brick and Tile (Mr. Mason)

1325 Jay St., BElmont 3-0391

Source - Lindsey property. - clay used practically as it comes from ground.

Bought from contractor, John Simpson, who runs mine.

Red clay once from State Property near farm school. Taken for highway.

Now looking for red clay.

Face brick only - different colors

Four kilns, production about 20,000 brick per day, use approx. 60 ton raw clay per day.

7,200,000 brick a year

American Clay Works and Supply Company
857 Bryant, Alpine 1261
Mr Howard Montague. (Alpine 1261)

use two clays, buy one from Perfect. who calls the clay his "black special" A fairly plastic soft clay.
Other from H.G. Johnson at Castle Rock who works. Has greater shrinkage and fires to deeper red, between 2 get desired results. C.R. clay softer, easier to crush.

Raw clay consumption. - 500 tons / yr.
Half & Half

Production: Flower pots

Test Run on clays used.

Drop back for this - Ch't

Place burned down in Summer 1952

Castle Rock clay has very high modulus of rupture in raw state.

4 | 1750

Western Tile Mfg Company Mr. Al Cummins
1695 Clay St., Cherry 8373

Clay back of Bachmans. - Red-burning clay
Buff-burning clay from George Lindsay.

Raw clay used about 425 ton/yr, 2 to 1
Red to Buff.

Products, window sill - quarry tile,

Mine is the Fountain mine at head of Cow Gulch.

Denver Fire Clay Company – (see Mr. Shepard)

2301 Blake, Tabor-0251

(Grade Info + analyses from Mr. H. Breitweiser)

North Golden Mine:- At lower depth. About 3 or 4 years left. G. C. Bennett foreman of both mines. Go to property of Mr. Wilson, mouth coal Creek Canyon. left side.

South Golden Mine:-

Plastic clay from George Lindsay.

North Mine – 8 or 10'.

Raw clay consumption. Approx 16,000 tons of Colo clay. About – ½ from Stone City. Also some high alum clays from Missouri.

To contact Mr Bennett, call Shepard and let him arrange for date.

Tests.

Sample: Footwall	Lower level (200 ft depth.) SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	Loss I	Cone
	49.51	1.30	33.25	0.31	0.25	13.82	33
~~Sample 2~~ Hanging Wall	45.98	2.76	34.00	0.43	0.33	14.03	33

Sample 2 Top level about 100 ft above others — entire vein.

50.18	1.26	32.35	0.33	0.23	13.87	32.5 to 33

Or [illegible] that following tests are most desirable.

* Firing behavior (Absorpt pores at diff temps + percent. shrinkage either lin. or vol.
* PCE
* Chem. anal.
+ [illegible] modulus of rupt (13 at 4 cone.)
+ [illegible]

(See Missouri Geol. Survey and Water Res. Vol. 28, 2nd. ser., 1943 McQueen

South Golden:- P.C.E

Select (Upper bed)	55.97	1.13	27.95	0.65	0.15	11.37	32 to 32.5
Dirty (Lower bed)	59.82	0.81	26.95	0.57	0.30	10.46	31.0

Used to run higher in silica, possibly raised in alumina,

North Golden - taken early 1950, run of mine.

45.49	1.67	37.05	0.42	0.32	13.69	98.64. 32½-33.

Chief variation in iron content, most on hanging wall

Series of samples run by depth, from Wilson mine, shows no change in depth that is consistent.

North Golden "black silica"

70.76	0.85	18.55	0.50	0.21	7.10	30 to 31

Leyden tan plastic - Lindsay total

64.26	2.01	23.37	0.67	0.53	6.10	96.94 Conc 23.

Golden clay low bonding - Stone clay self bonding

LIBRARY OF THE MUSEUM OF COMPARATIVE ZOOLOGY

Hack Hyland Brick Company. Jack Hyland.
Clay at plant. Been in use for last 60 years.
Use about 32 yards a day. (Could be cubic ?) may have meant month
Just make sand brick.
Plant and pit. 3800 Garfield, East 1217

Farrey Brick Company
No beer name, pit flooded. Local clay.
Plant and pit. E. 34th and Dahlia Dexter 7475
Farreys home – 2828 Elm, East 3962.
Farrey died – nobody running plant at present.

Brick Inc. – does not make them. Buy brick from other plants.

Coors Porcelain Co., Mr Ryland
800 Ford St., Golden.

Kaolin S. Carol + Fla., small amt English Ball, Plastic from Kentucky + Tenn.
Holdings just N. Cap Rock Mine on Rock Flats at N. end of Laramie ridge.

Sagger clay chiefly. Use very little from hogback. Have holdings north of Van Bibber, where old entry driven through hogback, Reston area. Also some in hogback S. 40. Laramie holdings as noted above.

No longer a power in local clay - check up land holdings to see how much tied up under Adolph Coors.

Has large block of clay land tied up but will not lease to local Ref. Co's

Mfg. - Brick, Struct. clay tile, flue lining, fire brick, vitrified clay sewer pipe.

Denver Sewer Pipe and Clay Company — Mr. Bell, Mr. Temple

W. 45th Ave. and Fox, Glendale 4781

Strain and Mine - More Fe, less plastic. - John Hayes

Johnson Mine — Myron Chase.

[Mr Arthur Grigg working here, formerly with Diamond F.B. Co (Canon City)

Laramie clay as bond. buy from Perfet.

buy from H. G. Johnson, Castle Rock

Ouce from Gettysburg near Parker

Laramie 2740± — Cone 18-19.

2460 to 2780

Larkspur 2840, quit about 1927-28

Also 3½ mile west sec 21-40 2740.

Strain and + "

Have looked N. of Marquiss - good clay betw. here + Eldorado - in stream - flint-like.

Clay consumption: — 12,634 ± Fire clay mining 1930

112,600 ± Brick " " " "

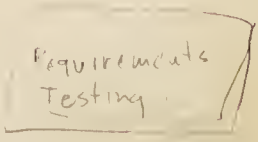
Capacity - Retract. - Dry Press 350,000 / mo.

Building - 3,200,000 / mo.

S.P. pipe. - 2500 tons / mo.

Stiff mud - used for 2 purposes — 1400 tons / mo. for refractories

machine — 1,000,000 building brick.


Requirements
Testing

Robinson Brick and Tile Company. Mr. Robinson
500 S. Santa Fe Drive, Race 2838
John Higbee. - Mine Supt. (Littleton 93M,
Littleton 93 M - 182 N. Grand

struct.
Brush + ceramic glaze tile.
Tons of raw clay 125,000/yr.

No use of names or mine locations, Mines.-
Chieftan — Lawrence.
Rustler — Benton.
Stranger —
Main —
Hogback — Mt. Kessler.
} 6

First opened in 1903 by Robinson, pere
closed during WW2 opened after

Water of plast.
P. C. E. + vitrif.
Shrinkage green-dry
dry-burned
Absorption + crushing.
Burning color.

Pressed

Overland Brick Co. – Mr. Bidwell.

1701 So. Lippen, Spruce 8385.

1,000,000 brick – 6 lbs bird

2 million a year.

Morrison – Bear Cr School – then turn to Morrison. Mr Montgomery.

Used to use some native clay but no more.

This comes to about 6000 tons a year.

Montgomery quarry is in Laramie, rt 70 on Bear Creek N. side of Mt. Carbon. Laramie is about vertical here, and shows over 100' shale silty clays & argill. ss. with a few coaly stn. but no th real coal beds.

At E well quarry friable white ss with plant remains

Name – Cowan clay quarry. – old quarrys across way Glory hole goes back 600 ft into hill.

Also make cinder block from it –

5th Ave. Cinder Concrete Products – E Rudy Utiger.

also clay from this pit.

Pit road is 0.1 mile from intersection of Rt 70 and dirt Rd that goes S from it at old Morrison Terra Co Ha works, on S side of rd. E end pit approx .15 from this intersection.

how much consumed per week

Denver Terra Cotta — Mr. Marks, ceramist
West 1st and Umatilla, Race 4643

Plastic Siding – Head of Laramie ridge.
Tom Bell. – Send Moffat R.R.
Purchase fireclay siding – (This more plastic – than most of other fireclay.)

Purchase – Indiana clay.

60% of body is clay, rest grog. – Use about
? → 1800 tons raw per year.
→ From 12 to 15000 – in good year. —

The Laramie clay, while plastic has quite abit of fine sand. Limit on non-plastic body is 25%.

Ceramic Tile Mfg Co. — Mr. James D. Mason.
George Lindsey. — His tau plastic. about Cone 28.
Production approx. 100 ton. / year
Buff, burning, plastic, lime + coal free.
Sill tile.

2.2 cu yds

1/3

3.

21,000

12,000 yds/day

24 yds (3) / 1000

15 yds

About 3,500,000

per year

2.20 yds / 100

2722.

2.20 | 6000.00

44

1600

1540

Clark Brick Co. M. R. Clark.
943 Decatur, Keystone 1707
locally — 8th Ave., in city, Common brick.
Use about — 10,000 tons per year of clay
~~sm~~ This figured from production figure
of 3,500,000 bricks / year

3.30

AIN 511-21

(1) Here the shale just above the Lytle-Glenwood contact was entered. Don't know whether the claystone below this or shale itself was used.

General. The basal cgl of the Lytle here developed here & anywhere else is 15 to 25' very coarse, with cgl. pebbles about 3/4 inch.

Eldorado Springs section

Part I- Abandoned irrigation ditch above rd at entrance to Spgs. S. side.
Measured up from top of massive ss at top Part II.

	Sandstone
3.3	Shale, silty, dk gray to gray where highly silty. with interbeds of argill aceous siltstone that increase in number toward bottom of interval. Fucoid impressions on siltstone beds.
0.1	Bentonite
1.3	Shale, dk gray silty, with laminae and thin beds silt. } #1
1.6	Sandstone, fine gr, ferruginous, with interbedded shely siltstone } #1
3.6	Shale, dk gray silty with laminae silt } #1
3.7	Siltstone with interbeds and partings of argill siltstone and dk gray shale. Silt beds up to .5 thick but averag. .4
4.3	Shale, shely clay, dk gray, finely silty with scattered laminae silt, often thin beds silt at top. } #2
3.5	Siltstone and dk gray silty shale, thinly interbedded.
1.5	Shale, dk gray, silty, with some laminae silt and 0.4 bentonite 0.3 above base.
#3 2.7	Siltstone and dk gray silty shale thinly interbedded.
3.8	Shale, dk gray silty some silt laminae

12.0	Silty shale and siltstone; interbedded, mostly siltstone, which is argill. to ferrug. thin beds less than 1" common.
.8	Silty shale, dk grey, grading into argill siltstone at top.
2.0	Argillaceous siltstone and fine ss.
7.6	Sandstone, massive, fine grained, Fe-brown weath. ripple mkd. top.
0.2	Grey soapy bentonitic clay, [Top of sample 4]
0.2	Argillaceous siltstone
5.5	Shale, silty to argill. silty with some irreg. zones argill. silt. dk grey to grey [bot of sample #4]
7.0	Siltstone, argillaceous, with local zones silty clay stone, some irreg. beds hackly silt. in upper 1.5.
3.0	As above but no resistant beds.
2.8	Sandstone, massive, fine grained, dk brn
6.0	Siltstone and hackly silty shale, dk grey, rusty ferr. locally zone about .2 at base with fine conc. ftc. [#5]
.8	Sandstone, fine grained, ferruginized argill. at top, locally has interlam. Silt.
2.0	Irreg. interbedded, dk grey to brn and lt grey siltstone, argill to loc coarse irregs. Bed argill silt. at base and at top.
1.0	Shale, dk grey, silty with c.2 bentonite at top. and .2 [illegible]

6

16

0.3	Siltstone, argill.	
0.9	Shale, dk, gray, silty	#6
1.0	Sandstone, hard dense very fine to siltstn at top,	
3.0	Shale, dk gray, silty clay.	
2.0	Sandstone, fine grained, hard, in slabby beds with shaly ptgs.	
.9	Siltstone, argillaceous, some Fe stain,	
5.6	Shale, lower 2.0 is plastic, slightly silty, dk gray. Remainder very silty dk gray to black (carb.) clayey shale. with interbeds siltstone ~~and sand beds~~ thin shale.	#7
Discont.		
6.0	Sandstone, fine grained, hard, dense Fe brown weath. with, some ~~stringy~~ pyritous silty in upper 2'.	
4.0	Dk gray shale (silty sh.) with zones gray sh. where silt rest.	#8
4.7	Sandstone, fine grained, and siltstone, interbedded. ss. weathers Fe brown, beds .2 to .8, siltstone as thin layers & ptgs between ss beds.	
2.7	Shale, dk gray finely silty	
1.3	Siltstone, shaly, gray with plant trays on bedding planes (soft in upper 1.3)	#9
0.8	Soft argill siltstone.	
1.3	Sandstone, fine grained to silty, hard dense. quartzitic, worm tubes located	
0.2	Bentonite	
1.2	Shale, grey to dk gray silty with	

silty laminae + ~~thin~~ zones in top & base.

1.7 Two beds argill. siltstone, top .6 to .8, bottom .2 to .6, separated by silty ~~dk~~ gray shale

0.2 Bentonite.

1.0 Dk gray finely argill. siltstone.

.3 Dk gray silty shale with 0.1 bentonite at base.

1.8 Argillaceous siltstone, platy to shaly (with minor interbedded shale silty)

±10 { 10.6 Shale, dk gray, silty with thin interbeds of argillaceous siltstone

0.1 Bentonite

3.0 Interbedded, argillaceous siltstone and silty shale, lt-dk chocolate in basal foot, siltstone locally sandy & in thin beds at upto 1 to 2' [N. 40° W, 40° S.] as top.

From here on shale slope - at most 15° of course. At least 15' of shale section ~~to~~ [illegible] incl. a few more good bentonite beds - Then concr. ss strat.

~~Looks like some concretion in part just above last bentonite. Then interbedded siltstone & shale. Looks like Gravesites.~~

Within next 120 to 30 ft strata will get typical Gravesville shale all the way.

6.6
4.
4.0
6.0
5.2
5.
3.4
7.4
6.0
10.2
59.0

7.
3.

9
5
6
30 8

5.1

On slope first ss ledge has been [illegible] worn, burrowings [illegible] qtzite thus zone = "qtzite" Debatz-Lloyd mtn.

Part II

59.0 Sandstone, cross bedded, medium to [illegible] fine-grained, weathers brown.

2.7 Sandstone as above with partings of shale

11.5 Silty to sandy shale with irreg. interbeds [illegible]

11.0 Sandstone [illegible] fine gr. to silty e.g. [illegible] with [illegible] silty sh. [illegible]

36.8 Sandstone, [illegible] to v. bed., fine to [illegible]

5.5 Irreg. [illegible] sandy silt [illegible] with some [illegible]. Argillaceous material dk. grey.

2.0 [illegible] shale with thin interbeds [illegible]

8.7 Shaly siltstone [illegible] is chiefly [illegible] with [illegible] the 3.7 chiefly silty shale with [illegible]

17 to 16' Hard fine ft. cgl. ss, locally Fe impreg. with stringers cgl. ss, some pebbles. Sand shifting.

Disconformity — Little Klondike

5.3 White argill. ss, fine to med., friable, locally yellow & pink stain, interbedded with light grey clay stone pinkish weathering sandy zones, thin beds of zeolite

dk brown to black surfaces on joint planes

3.7 ss, massive as above,

1.3 Weathers light grey, pink & yellow silty clay stone

.6 ss as above

5.0 Greenish silty clay stone some grey & pink weath.

1.7 Sandstone, hard fine to med. locally fine grained

10.0 Silty clay stone chocolate & pink, less chiefly green and red

65.0 Sandstone, white & grey, to yellow, fine gr. Soft to Friable, weathering with a few green clay stone partings between 1/16 and 2 ft. Celtic Zones begin at 25' from top. Gets progressively harder

24.0 Clay stone, silty. Upper 6' light green, yellow to light weathering. Next 6' mixed red, brown, green and yellowish green

2.6 Red argill. siltstone grading to less argill. siltstone

20

Sandstone - fine to coarse with some zones fine cgl. weathers yellowish orange, pushes out as rockstone

10.2 Interbedded red & green clay with silty clayey zones, one .8 thick 3' from top and base, bed 2.5 thick, other thinner ones locally.

19.0 As above with local silty zones reddish maroon at top, unit in lower 16'.

Section terminated here at top of mud-rich siltstone, pinkish white & cream, weathers crumbly brown with light laminae, cross bedded and thin beds - to about 5ft thick base of ~~cream~~ cream.

Rubey Clay Mines. Linder Block, Golden.

Bill Perfet. –

Sell raw clay only. –

Chiefly Laramie. –

Rubey Mine – N of 19th St. – Sewer Pipe

Perfet Mine – S of 19th St. – Brick

Perfet Special W.

see below Going west – Gray, tan, white veins, then ~~blue clay that~~ – 24th St. clay.

Raw clay production per annum. –

49,653	Perfet	1950
34,183	Rubey	1951
83,836	Total	

Perfet fire clay

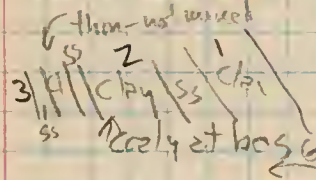
Most working the Ft ^ mine S of town.

Mine 4 separate beds, east to west

1. Perfet Special – Burns gray
2. ? – Tan clay
3. Perfet white – white
4. 24th St. clay – blue, burns red.

Hogback Mine of the Robinson Brick & Tile Co

Hogback – first ~~mine~~ vein –



The ss thickens to 5

3 vein – consistently carbonaceous. – up to 6 lb ss silt stn., local coal, not very plastic and John says not very sandy.

John says near surface more plastic – brown

Between 3 + 4 is 15 ft white fine ss

#4 is about 6' thick. – has basal bentonite, silty cl. 1.6 silt just above some Fe concs. in upper part. Foot wall rippled – ball ripple vein

5 + 6 – thin beds within 15 ft of #4

The #4 is upper Glencairn – rest either Dakota or the small Glencairns thickened.

Man Mine – A double operation –

M.10 bed, which is weathered sandy zone below Glenn-Lytle discont. – used in brick mix.
Man red, – clay between upper Lytle sands & basal. – see Turkey Creek section.
Used exclus. for brick (in mix) no apprec. is. chiefly red, some green streaks.

Bed on hogback E. side. Above ss. that caps ridge. Good plastic cl. 4' thick.

Above this 10–12' feet ss with another thin bed plastic cl. ss ledgy shaly.
Clay is 3'±.

Rustler Mine – Gruneous on Alameda

Stranger Mine – one at saddle on Alameda hogback now abandoned. Robinson no longer leases

Chieftain – both sides highway, 4 clay beds 2 of best ceramic, ⅓ width – of strip which is ± 50', ss forcible mine with clay.

Bottom clay bed has coal over it. This – chief clay – used in all mixes.

Cinder Concrete Products

1155 West 5th. – Mr. Rudy Utiger

Make clay lite aggregate, plan use 600 tons per day. Used test burning clay. Use for light weight concrete products. At present operating with clay from ... pit, Salt Lk.

Spring Canyon section #1.

15.0	Sandstone, massive, fine-medium quartzose [illegible]
0.2	Thin clay parting, dk grey plastic.
13.2	Sandstone, thin to [illegible] friable, fine grained, [illegible] silty. Grades into interval below with [illegible] except for bentonite.
25.7	Sandstone, massive, fine grained, [illegible] grading downward into siltstone, [illegible]. Laterally [illegible] to sandy shale.
22.0	[illegible] bentonite, with thin [illegible] type, [illegible] Inoceramus [illegible] ("A"). At base is 1' bentonite. Sample 1.- lower 4' including bentonite.
A813	
8.0	Argillaceous siltstone & ss, shaly with some layers hard siltstone, dk grey silty shale. Gyp partings common. 0.1 bentonite 3.4 from top and 0.3 bentonite at base. Locally a thin bentonite comes in 1.0 above base. This interval [illegible]

particular, cross bedding becomes
Sandstone, Hard Ironstone band
3.2. is above with more hard shale
siltstone and fine sandstone,
very little shale.
15.1 Sandstone, Thin beds of
fine with cross bedded, siltstone
and shale. Cyprina
Sp. silicified
shale Is
fine U-shaped
worm tubes,
plane
Interval between more shale
dominate. Sample 2 from
shale
.5.7 Change to blue shale with thin
beds of laminated siltstone which
Ledges of platy
siltstone, about
beds. Sample 3 from
shale in this interval
6.2 Shale, siltstone
Ironstone at up to 0.6
Fossils Sample 4, shale,
A814 this interval. At these, Fossils "B"
3.7 Shale with
sandy
Sample 5
0.4+ Bentonite

1.9	Shale, as above (Sample 6)
0.1	Bentonite
0.2	Shale
0.6	Bentonite
4.6	Shale, as above (Sample 7.)
3.7	Top of ½ to 1 inch unit of coarse limestone with fish bone gal. then rock is interbedded dark shale, siltstone and fine ~~ss~~ 2nd ~~sand~~ limestone, siltstone beds up to .3. These have fish frags, Inoc + cylicers. Top 6" is of shales, HC inverts. This zone is petrif. wood, rhs have strong cut surface and fresh breaks. Shale = Sample 8
3.0+	[illegible]

Spring Canyon Section 2.

[illegible] with float of fine grained ss beds

4.4 ss: fine grained [illegible] bedded [illegible]

5.3 ss, brown-vs in thin beds fine [illegible] platy to shaly gray siltstone

5.6 ss massive ripples: fine gr x-laminated with [illegible] beds in beds av 10.8

6.4 ss with fine gr. with partings of argill ss [illegible] bedded

4.0 ss. with bedded [illegible] argill when weathered about 1.6 inches siltstone at 1'2 1/2 beds fine and gr very bedded ss. ripples in argill siltstone.

6.5 ss. thin bedded [illegible] ss with siltstone [illegible] ripples chiefly fine gr wuggy quartzose ss. some partings argill siltstone in beds [illegible]

UNCONFORMITY (hytle clerman)

3.7 sandy claystone grading to argillaceous light grey with pink & yellow stain. (This grades almost imperceptibly into unit below. Thickness of claystone varies from 1'± to 3'±.

23.6 ss, massive, fine gr, x-laminated, weathers light buff with pink & purplish stain

2.4 claystone, silty, grayish green, with red & yellow weathered zones resembling coal

1.4 argillaceous & silty to sandy claystone weathered red, pink, & yellow.

21.8 ss, massive, fine gr, x-laminated. Thickens to 5.5' with thin wavy interbeds & lenses of green silty claystone. Local zones of conglomeratic gl, particularly at base.

13.8 ss massive x-laminated weathers light yellowish buff fine to coarse gr a few zones fine cgl. 2.2' of conglomeratic cgl locally present about 6' from top and zones of interbedded claystone.

5.2
3.2
4.3

12.9 ss + cgl: Masses, x-bedded, upper 3-4' cgl. few lenses non-cgl mat'l: cgl lenses thinner. base of this interval obscured by slope wash (approx 12' meets from base) last interval is zone of clay upper 2' yellow-tan of permeable pedding & maroon & clay blue. few feet below this typical dark green clays & shales of Morrison are in.

[Box Elder Creek]

Greenacre section.

Part I. Measuring up from base Gleneairn shale on top of the 3rd ss.

↓ Top 3rd Sandstone

2.9 Platy to shaly siltstone and interbedded siltstone shale. Gray, weathers lite gray and buff. Shale [illegible] in mid part.

1.0 - 2.0 Platy siltstone, massive bed lenticular siltstone but varies lat. & locally gets sh y. Weaths buff to dk Fe brown

4.3 Interbedded argill, siltstone and silty shale. Lower 1.5 chiefly siltstone with huge Fe stone concs up to 1.6 x 5.0 across. Above this 1.0 dk shale with local Fe stone conc & lay 1 to 1.5 ft thick resistant siltstone with silty sh partings & below.

2.2 To Grn dk gray shale with scattered beds of gray siltstone. Collected "A, marine reptile, just below this in top of siltstone. (Sample of this 2.2 ft.)

0.3 to 0.6 Fe stone conc. zone.

15.7 Dk gray to black fissile, massive in upper part. Lower 4.0 ft blocky, then thin bedded. This shale is uniform lith dk gray. Lower 5.7 ft - Sample 2
Upper 10 ft - Sample 3

0.8 Rusty-gray silty shale & shaly silt.

all ferruginous, local Eisstone Concs.

22.8 Shale, as below ~~Ferust~~ gens. Grey-dk grey fissile with a few thin lenses ~~of~~ assoc with silty layers. Silty ~~layers~~ 1.0" ± th. Lower half = Sample 4, Upper half = Samp. 5

4.5 Shale, dk grey to black, weak ~~a~~ blue-grn fissile ~~with~~ few thin ~~lenses~~ ~~of~~ ~~silt~~ ~~stone~~ ~~in~~ ~~1~~ ~~part~~. Sample 6

23.5 Interbd silty grey ~~shale~~ ~~to~~ ~~fine~~ ~~sand~~, siltstone beds thin, irreg, weathg lite grey + brown. Becoming ~~more~~ ~~silty~~ ~~in~~ ~~upper~~ 5'. Interbd ~~fine~~ ~~sand~~ 9.0 ft above base. Not sampled

4.5 Shale Dk grey to black, fissile in ~~thin~~ ~~beds~~ ~~of~~ silt. Sample 7

0.3 Bentonite

1.2 Black shale with ~~thin~~ ~~beds~~ ~~of~~ ~~fine~~ ~~sand~~ ~~to~~ ~~silt~~ ~~size~~ siltstone-~~sandstone~~ ~~of~~ ~~red~~ ~~brown~~

0.1 to 0.2 Bentonite.

(Part 2) ~~Core~~ ~~Lost~~ ~~Core~~

11.0 Shale Grey to black ~~fissile~~ ~~with~~ scattered thin layers siltstone weathered Fe brown ~~stained~~. Lower 5' = Sample 8 Upper 6 = Sample 9

7.0 Interbedded sandy, fossiliferous, platy limestone and dark to black shale. [illegible] of limestone to shale is 2.0 feet : 3.1 of dk sh, thin ly limest sh.

A810

Sample 10 from 3.1 sh.

7.8 Interbedded gray silty shale and shaly siltstone. Siltstone in thin beds and [illegible]. Silty shale in upper 1.6.

0.1 Bentonite 4 feet from top.

Sample 11 = all but upper 1.5 feet.

0.9 Bentonite (Sample 12)

0.7 Shale

0.2 Bentonite

3.2 [illegible] to silt, 0.2 Bentonite 2.4 from base

8.3 [illegible] siltstone and [illegible] shale.

A810

12.7 [illegible] shale, [illegible] shale, [illegible] thin to [illegible] beds.

3.6 Cross-[illegible] siltstone

2.5 [illegible]

K2.0+ Sandstone beds [illegible] fine grained, [illegible] gray. [illegible]

3.0
5.2
14.0

Sandstone, 14', zzc soft [illegible]
sandy bedding, best quartzose [illegible]
(thin bedded, sandy [illegible]
zbouc

9.7 Sandstone, hard, quartzitic, brown
weathering [illegible]

Slope wash - Ice: 17 ss is [illegible]
Dark zone contact - [illegible]
zone.

Greenhorn - pzct IV

The middle [illegible]
but [illegible]
it begins [illegible]
was 19.0 - [illegible]
and [illegible], sandy portion
salt [illegible], passing into sandy
at [illegible]

Greenhorn - P-- I [illegible]

[illegible]

7.0 [illegible]
[illegible]

7.7 Discord

1.0 Sandstone, massive, [illegible]
[illegible]

0.6 to 2.6 Shale, [illegible]

.8 to 1.6 [illegible]
[illegible]

2.4 to 4: Shale, sandy, [illegible]

2.8. Sandstone as above, some [illegible] lenses
chert pebble cgl.

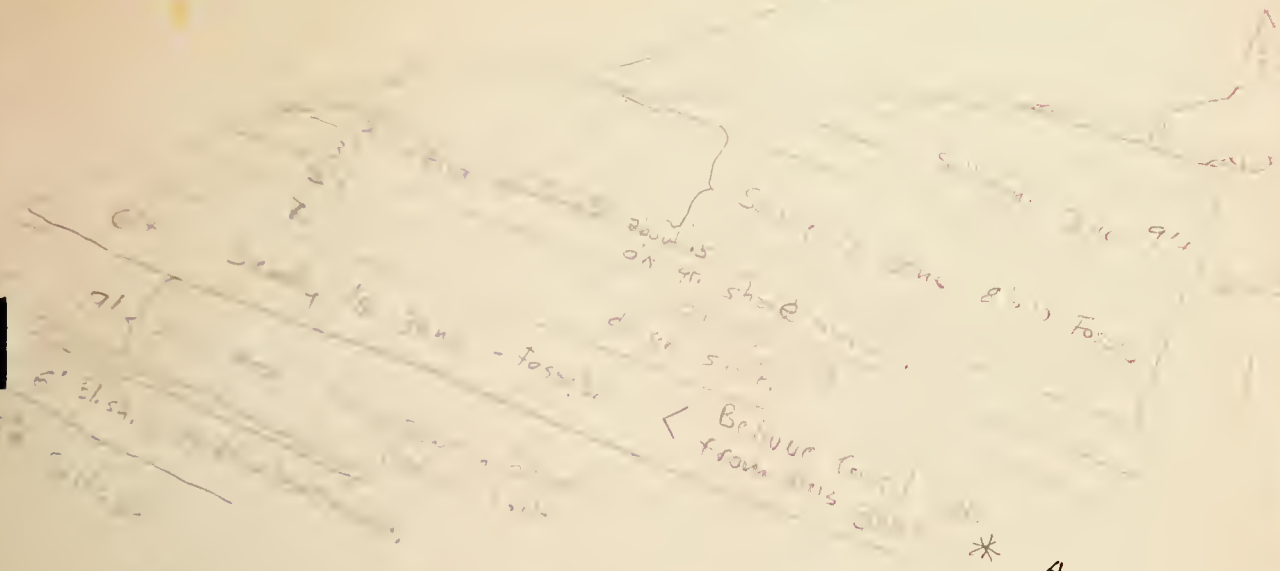
4+10 Glauconitic contact,

7.0 Clay stone sandy and [illegible]
Sh., obscured, weathers [illegible]
grey, [illegible], contains
ss strat weathered in rect
[illegible]

26. Sandstone, massive, [illegible]
like spray, [illegible]
some [illegible]

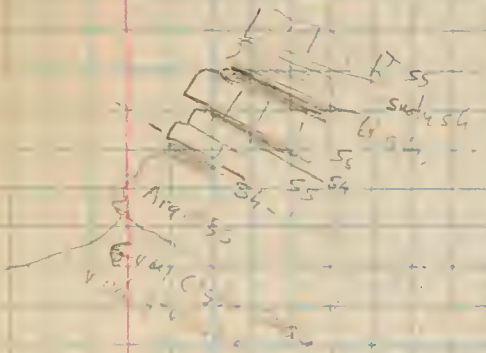
[illegible]

Approx 25' of Slope [illegible]
ss bluff - 14 slope, some [illegible]
[illegible]
[illegible]
[illegible]



* A 8/2

Bellvue section, Lee's measurements of lower part of

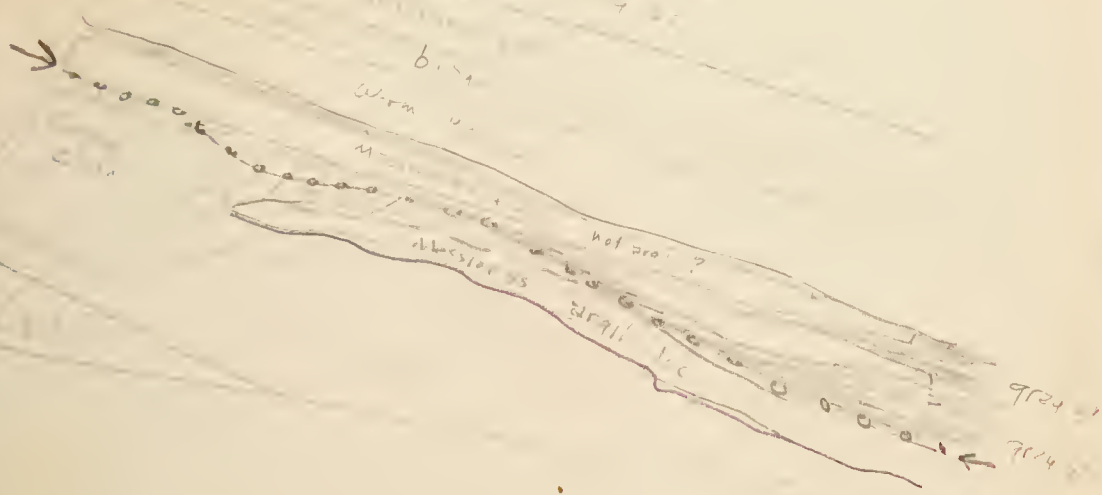


Note — Lee's lower shale pinches out – or gets broken up into a few thin claystone beds several tenths of a mile east along rd to Fort Collins.

Glauconite – Sub visible recognizable though section not complete. See sketch. Collected a num of fossils – in lower limestone

Clean Lytle Contact.
On road 5 of ditch.

1.0 to 2.0 Black shale.
5.0 [illegible] claystone beds [illegible]



1.2	Aquiliss & sndy clay, wzth grzy & lte qrzy. Soft. Crsp. bc grzy clay when fresh.
0.6 to 1.0	Sandstone. mssive sc brzwn to buff wzth
0.1 to 0.0	Dk grzy shale White aquiliss, soft, tocklly, sndy clstn Same med & lte shs.

HANDY DITCH

Dry Creek Section

Starts at top of Dakota, Cheyenne Arkosic zone just above,

16.0 ss. fine gr. calc. sil. Thin beds bedding + cgl. x-bed, few 3" clayey argill. silts. + sandy silts. bed. good silty sh.

12.2 ss. fine calc. bed + arkosic in part. x-bed & irreg bed. Lenses + nodules argill. clay. Jacks with sil. below. Lam. clay & grey & pk. plant remains in bot. 4"

20.0 silts. + ss, argill. irreg. bedded, few thin. Kaiparowits ss. in upper 10' + weathering upon 3-4' above base. Most of this section is rather sandy clayey ss. argill. ss. may be faulted at base. which is obscured.

DK

GLEN 5.4 dolomitic. pebb. shale, silts. sand

8.6 silts, argill, + silty shale. Few thin hard beds upper part: more + more calc. by, with base. Same as above.

2.2
3.3
4.0
2.0
14.9

2) 5.2
2.2
3.5

3) 10
2.1
3.2
6
3.6
9.8

4) 4.0
2.0
3
3.6
3
12

5)

14.9 sh, silty, with interbeds hard platy siltstn & argill, impure fine clastic siltstn, platy & shaly: remainder chiefly silty shale with scattered hard beds of siltstn.

11.0 siltstn platy to shaly, argill with interbeds of black shale & hard beds of ss with F black lam mica

2.0 ss: platy fine gr breaks silty with shaly partings

9.8 siltstn & fine ss: interbedded with silty shale grades to ss to beds of siltstone & dark silty shale. ss with c, pyr at base

16.6 siltstn & grey to black shale, interbedded siltstone in thin beds & laminae with occasional flat rhomboid calcareous concretions scattered throughout. Lower 4.5' siltstone (only black shale with .4' bentonite at base. Coal concretions in bentonite.

1.2 interbedded siltstn & dark grey shale. siltstn in thin beds & laminae: fucoid al markings on bedding

.2 to .8 | sandy lst fossiliferous: petrolifferous:

4.0 | siltstone & sandy lst, interbedded thin beds with partings of black shale fossiliferous. In ci. stone of lst

11.0 | siltstone & shale: siltstone in thin beds & laminae: dominant in upper part of interval, but becoming less in downward. Scattered fossils in siltstone beds.

6.1 | shale, dark grey to black in upper 2' and in beds of siltstone, becoming prog. silty downwards in interval.

9.4 | silty shale with ledge concretionary siltstone 2' from top becoming prog. less silty downwards

14.0 | dark grey shale: grades with interbedded .1' bentonite 3.8' from top.

3.3 | siltstone & silty shale upper. argill silt. dom in a silty shale becoming less silty downwards then back into black shale.

19.0 [illegible]

6.6 [illegible]

4.0 dark gray to black shale with fine [illegible]

1.6 [illegible]

4.0 fine grained [illegible]

5.7 [illegible]

1.2 [illegible]

7.3 [illegible]

4.7 [illegible]

3.2 irreg. interbedded dark grey to black sandy shale and thin beds of argill ss. basal 6" black sandy shale; rests in sharp contact on green shale below (Hand specimen

Discont GLENCAIRN

LYTLE

.8 Green sandy clayst.

1.0 Irregular lt. grey argill ss. fine gr.

2.0 Green sandy clayst.

Thin irregularly all clayst thins & thickens abruptly

Section continued on W side ditch tunnel

25 ss. irregular - band fine gr. weathers buff to iron brown

25' (approx) clayst. obs. upper part banded and green spots

8' variable irreg. clayey ss. & interbedded red & light grey green sandy clayst. ss. weathers buff - band bodies. Includes lenses of chert pebble cgl.

Coal with clays

15 2.8 clayey gray & green clayston.
Some thin beds fine gr ss.

4.0 Fine gr sandst as rock to purple
weathers dark brown & dark purple
brown apparently a dense grade
laterally into sandy purple clayston.
below this clayston grades down
into sandy dark gray clayston with
scattered wavy beds fine ss (this
talus interval ~~shows~~ 10' thick)
Rem section obs by outfall
Remainder of section obscured by night-
fall.

Castle Rock Area. [Denver: Arapahoe vicle Colo State map]
Stroud Whisenhunt. 147-R

Since 1916

Johnsons clay mine.

About 15' av. flat lying clay (0 to 25') Ten foot limit for work. Overburden 10'±, down to over 25'

Mine leased by Denv. Sewer pipe for years, Johnson inherited it, and now mines it and sells it, most to Denver Sewer pipe

Clay bed cut by rock channels, ss & cgl, white. The white cgl ss

red cl. horses
white ss & cgl
clay
local lenses of mica rock

Clay chiefly yellow, sandy, red burning. Some gray and some red locally

Clay bed varies. In cut following section

Overburden 10 ft fine gravel & sand.
White arkosic cgl ss sits here
9.5± Chiefly yellow fat plastic, lower 3.4' ft solid yellow. #2 then red streak 0.6 to 1.0 Then top part harder mottled lite gray & yellow & red #1
persistent brid
1.7 Mottled gray and red clay #3
1.5 Mica rock [sampled]
0.8 Gray, buff, silty clay
1.0 Mica rock
2 plus Gray sandy shaly clay, with plant frags. #4

45

Only very top of bottom dk brn clay taken.

Total yearly production of raw clay is about 20,000 tons.

Checking with Richardson (1915) this clay is in Dawson arkose, Richardson thinks Calhan clay is too. I would guess it is in upper ½ of the formation but prob. below the andesitic lenses.

The formation over the clay is coarse arkosic ss and cgl. ss with pebbles up to 0.5 and some still with xl form. This rests disconf. on the clays and cuts them out locally in channel deposits that trend southeastward

For further remarks on Dawson see card on Richardson 1915.

Whisenhunt mentions a few other openings in this clay. Robinson [illegible] took some from nearby, just north of Johnson mine, near lava-capped butte, about 5 years ago but no longer uses it. Some openings made east of Hwy 85-87 in vicinity Castle Rock but clay not 'fat' enough here Also once mined near Larkspur.

AIN 50-44

① Old opening in upper Glencairn bed. At south end about 3.5 ft of clay including 0.3 bentonite at base. To north roof raises and cut (and presumably clay, is 10'. Attitude on rock under bentonite N. 20 W. 75° E.

② Johnson mine of the Denver Sewer pipe Co.

③ Section of upper Glencairn clay exposed in old cut.

5.7	Sandstone, fine grained, thin bedded, 0.5 to 0.6, with interstratified thin layers & partings argill. silt. & silty shale.
0.1 to 1.6	Gray clay finely silty to silty with some argillaceous siltstone
2.2	Siltstone, very argillaceous, soft, silty clay, blue-gray, with streaks of silty clay about 0.4 wide its top 1.0 from base. This clay while gray, appears to be bentonitic. Fractures weather yellow and fresh surface soapy.
2.6	Sandstone, fine grained, thin bedded up to 0.8 with silty & shaly partings, Kipp zone
1.7	Interbedded silty clay stone and siltstone, 0.5 above local thin bed ss in mid part.
.8±	Sandstone, fine grained
1.0	clay, dk green silty clay.

1.0 Interbedded laminated siltstone and white to tan clay. Powdery to slightly plastic.

1.0 Sandstone in beds up to .4 clay partings.

1.0 Interbedded gray clay & silty clay and tan brown silty layers.

2.2 Faulted zone, clay, slickst.

2.4 Horse of gray clay with silt interbeds

chief fault 4.2 Fault zone, gouge & chunks clay etc.

3.2 Interbedded gray shaly clay and tan beds of siltstone. Lenticular, lenticular, shale predom

0.3 Soapy tan colored clay, from an bentonite.

12.2 Dk gray clay, plastic, lower 6' real good, upper with silty streaks.

.4 Bentonite

.6 Siltstone N 20 W 63 E

? More clay

Cbs overlie

Upper Cbs Lower N 18° W, 62 E

(4) These two beds are the two ss that thicken north to form the ~~massive~~ ss at Placerville and Eldorado.

(5) Lower pkty ss. The Gl[illegible]-Lyth. contact is sharp and [illegible] owing to

poor exposure of soft beds. At this locality and to S. across draw the lower platy ss grades or sits on massive light ss, shown. No black shale visible. Is shale ? bleached or claystone - on

this depends whether contact goes at A or B

(6) Remains of exploration trench here shows presence of a bentonite in silty gray shale This is 3rd Glencairn clay

Report of 1951 shows 3 Glencairn seams [illegible] clays 1st clay only one mined in dial exploration tunnel to other Glencairn seams now [illegible] driven in Nelson Mine.

Fig. [illegible] higher

(7) As next end to base of prospect the Lytle is [illegible] thicker & thicker. Its great [illegible] coarse ss dbnd and sgl. At north end [illegible] above ss also [illegible] and 3 "distributive" strip is present.

(8) At three openings in 1st Glencarin clay. Sopeum beds vertical. Just north of end. → N 12° W, 51° W outcrop.

(9) Series of caves in over old steps. Beds about vertical, Strike N 34° W. Bedrock jumbled to form caves in clay.

(10) Ledge of interbedded limestone & sandstone. Beds overturned. Locks like strike is N 28° W, 52° W overturned

Partial section of basal Benton at Rustler mine.

Top of Dakota-transition zone.

7.0	Shale - mostly obscured, upper 2.7 feet is Dk gray to black, hard, silty clay shale. 0.2 layer argill. siltstone at top. [Sample 1]
0.4	Flint-like clay, sooty, lite gray, may be bentonitic. [Sample 1A]
0.5	Argillaceous siltstone, ferruginous.
1.8	Shale, gray to dark gray & black, silty in lower half with some silt laminae. and thin beds. [Sample 2]
0.2	Argill. siltstone with shale partings, fe saturated.
3.2	Dk gray to black shale, locally fissile silty in bottom 1.2. [Sample 3]
0.4	Brown ferruginous layer silt?
3.0	Dk-gray to black shale [Sample 4]
7.6+	Shale as above with scattered concretions Fe stone, Festone. layers, some cone in cone. Layers concr in shale 4.0. lower 2.3 = [Sample 5], next 2.3 [Sample 6]

Remainder of section slumped or obscured.

AIN 50-17

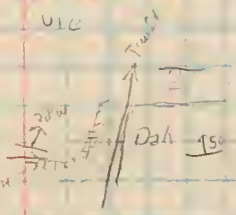
(1) N 22° W, 84° E.. bo's bel of upper Cheyenne open here. Beautiful ripple marks under bentonite on siltsth. ptny base top bed. Dakota in channel here cuts out. minor beds & ls incised in the top bed.

(2) Minor fault, strike N 34° E, dip about 25° SE, offset up to 10' with NW side moving E

(3) Dip strike on base Dakota N 25 W, 75° W overturned just north fault changes.

(4) Strike N, dip 20° W. overturned.

(5) N 34 E fault trend — plan — N 35° W 50° W overturn on Dakota 25' north fault.

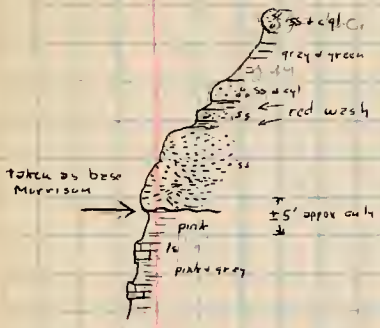


(6) Strike N 75° W, dip. 40° W overturned on ripple split.

(7) Basal Lytle cgl comes in here & present intermittently between here and Rt. 40.

(8) Basal Morrison. consists of several beds, bed of lenticular sandy lite grn ls with pink mottled stain in pink & grn shale, 15 to 20 at this with 2 lds ls @ ± 2' thick. On top of this is thick lense sandstone white

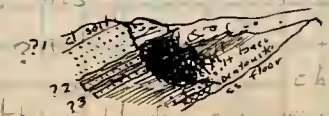
*8 (cont.) is massive x-bdd. fine to coarse, brown weathering, with some intracl clay boss. Thin zone consists of several ledges with red clay wash and lower narrow benches. Fresh surface is grey-green clay with limestone above. Basal contact with pink clay & is taken as base Morrison.



*9. - Ledge of massive cgl ss + cgl.. Base of hvy bdd. Pebs are gray recrystd. Chert, qtzite + white jasper-quartz plus multicolored rounded pebs - subangular to rounded. Cgl in basal 2 to 4', has hzd clay, sdy, matrix.

Above 1 - minor cgl ss. Above 11 - 14' is slope on sdy clay with thin bds ss minor red, mostly gray-weathering clay. Then right at pine grove is crumbly cgl with pebbles up to 1½

10. The [illegible] base [illegible] top [illegible] pebbly [illegible] being with [illegible] top cut [illegible] the bedding. This [illegible] ss bed [illegible] upper cut [illegible] locally [illegible] channel-fill or else [illegible] detrital with top [illegible] wash.

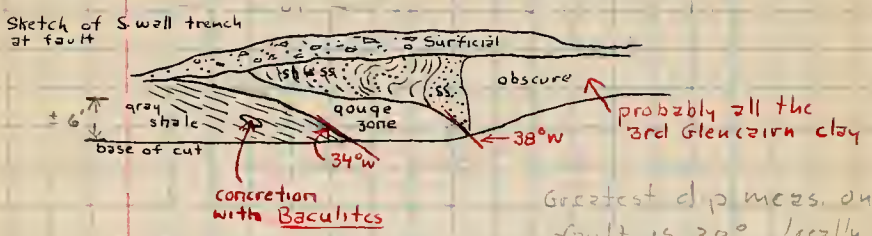


11. 2nd Glencairn ss ~~takes over~~ shows crest with ~~2~~ 1 ~~goes down for slope and appears at the toe~~ on it very little grave. ~~to S.~~ 2nd Glen, is highly variable but locally is very ferruginous.

12. 1st Glen takes over crest of hoebush with 2nd forming shoulder on front. Locally the 2nd Glenclay is all but pinched out between the two.

AIN 50-37

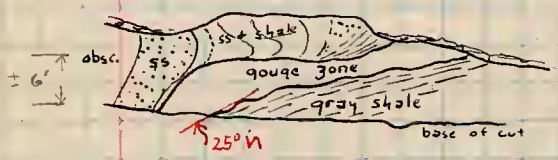
(1) Trench by Colo. Sch. Mines exposes section from Lyons to Pierre through Golden fault Details of this fault can be seen —



Sketch of N. wall

Greatest dip meas. on fault is 38°, locally less than 5°.

Sketch N wall of trench.



Big question is whether this is the fault and shale Pierre, or whether a subsidiary fault and shale Graneros.

Correction — shale is Pierre, concretion containing Baculites found in place in position indicated in sketch above

(2) This pit shows 3rd Glencairn sandstone (+ Glen-Lyt contact — possibly with fault) and above it the 3rd Glencairn shale — [has its lower bentonite

visible just above sandstone. Probably the only Glencairn shale exposed in the entire hill. Fault has cut out others between here and Confusion Hill.

AIN 84-02

① Band of concretions in cracked clay soil. Pierre shales. West of her shaly soil continues to foot of next rise but no way of telling whether it is all Pierre or Benton faulted against Pierre

② Shaly soil some bits of concretions and none diagnostic concretions. mixed with gravel

③ Weathered patch of clay, and bits siltstone + sandstone. Looks like Glencairn

④ Typical Lytle-type sandstone. Fe specks, in place

⑤ Outcrops of basal Morrison sandstone.

⑥ " " " " " " N45W ⊥, There is also a double SS here—exposure at ⑥ is very full channel for this. but it doesn't make much diff in drawing contact

⑦ Lytle between dots. West dot at base, thin-with Porcellanite bands 30' above base. Thin bent seen S of School of Mines trench also. East dot on thin cgl above grey clay stone, may still be in Lytle or could be Glencairn-Lytle contact.

Note—The Morrison west of 7 has fault in it just above 2nd SS from base.

⑧ Approximate Lytle-Morrison contact. Here there is a bed of the porcellanite a foot thick one can Rainbow Crest this position

⑨ Approx. Lytle-Glencairn contact. Things are a sheared mess in here.

(10) Good Cuttle-Glencairn contact. As you trace this north it becomes a fault contact.

(11) Fault trending N. 21° E cuts through south end of ridge. Downthrown is to SE.

(12) Fault N 25° E, Downthrown to NE. Fault crosses hill.

(13) N. 46 W, 45° W overturned. Probably like a Dakota class bed.

(14) Sandstone in Morrison N 40° E ⊥, may be basal ss.

Four Mile Canyon reconnaissance

The road cut shows black shale resting on massive, quartzose, x-bed ss which is Lytle. The ss in Lytle at road cut coalesces up hill to north. And coarse cgl with pebbles quartz Mississippian come in. Would estimate, maximum thickness along ridge ½ mile to north at about 65'.

Following work needed to complete adequate survey of beds in:-

1. Canon Empayment area.

   Detailed sections in ① Turkey Creek district
   ② Beaver +/or Oil Creek areas

2. Beulah district - ④ ③ Parkdale.
   Detailed section of ① Beulah ten and, if possible flanking sections.
   ② St Chas.
   ③ Rye or area
   ④ So. Pueblo Co.-

3. Perry Park - A section of Glencairn & Lytle.

4. Southeastern Colo.-

D.S.P+C.Co. - new entry in Johnson Mine S. of old one.

Mine level P.G.E. 32½.
250' below mine level P.G.E 28
Chance is increase in FE, but prob. other salts too.

Moffat mine - not Johnson Mine.
Myron Cuzse. - at new hole. 2 men.
Strainland - Jack Hayes. 11:30 to 12 at house

Hedley	3020°	30 - 31 (corr)	
Moffat	3140°	32½-33	New Mine
Helmer	3020°	30-31	
Strainland	3000	30	

Stop at Trumbal Brick & Tile Co. Fred Nichols

Golden Fire Brick Co. — 1 mi N. Golden on Washington, Golden 20

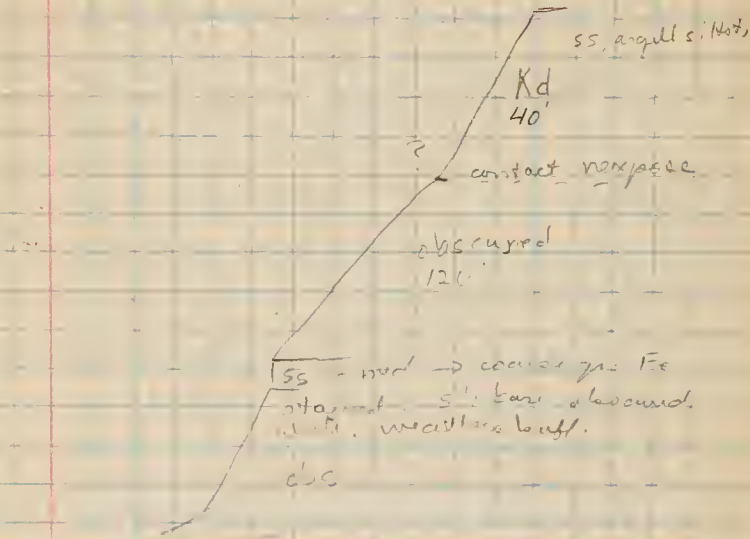
Denver Fire Clay Co. "Since 1876" — 2301 Blake, Tabor 5-0251

Denver Sewer Pipe and Clay Co. — W 45th Ave & Fox, Gladdale 5-4781

Robinson Brick and Tile Co. — 500 S. Santa Fe Dr., Race 2-2838

Rube — 7475 W 33 Av. BE 3-6181

Norton — 2050 Perry, GEnst 3-4409



3: ss: cgl. c ? with undergl
wht pebble argill clst below

3 cgl ftc ss, clst; wht, ss

B
P
P